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The awareness of parents on the relation of the quality of diet and its effect on the incidence of caries in primary school children in Riyadh

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ABSTRACT

Background and Aim: Dental caries is considered as a multifactorial disease and has been documented to be a major public health challenge in Saudi Arabia. Among the different factors associated with dental caries, the awareness of parents to the role of diet has received relatively little attention. This study was aimed to investigate the association between parents' awareness about the role of the quality of diet as a potential risk factor in causing dental caries in primary school children in Riyadh. **Methodology:** A total of 103 children (59 boys and 44 girls) aged between 5 and 12 years from different sociodemographic backgrounds in Riyadh region were examined to assess the caries incidence and severity. A validated questionnaire on diet and nutrition was administered to both fathers and mothers of the children examined. The associations between caries incidence, diet scores and sociodemographic variables were examined using logistic regression models while those between caries severity and diet were examined using linear regression models. **Results:** There was a significant association between diet and both the incidence of dental caries ($B=-3.024$, $p=0.007$) as well as severity of dental caries ($B=-3.099$, $p=0.002$). Among the sociodemographic variables, family income influenced the incidence ($B=-1.204$, $p=0.011$) and severity ($B=-1.370$, $p<0.001$). The age of the parents or their education did not have a significant association with the caries incidence or severity. **Conclusion:** Parental awareness of the diet of their children and their implementation of a healthy diet has a significant negative association with caries incidence and severity.

Keywords: Diet, Dental Caries, Parental Awareness, Preventive Dentistry

1. INTRODUCTION

Dental caries is a major public health problem and is has been shown to be the most widespread noncommunicable disease (NCD) worldwide (World



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Health, 2017). Although traditionally defined as a microbial disease, it is today recognized as a multifactorial chronic disease caused by demineralization of hard tooth structure (Banerjee and Doméjean, 2013; Kidd and Fejerskov, 2013). The wide range of factors known to have an influence on the incidence and severity of dental caries include socioeconomic status, exposure to fluoridated water, parents or caregiver behavior and consumption of cariogenic food (Banerjee and Doméjean, 2013; Carvalho *et al.*, 2016).

Nutrition is one of the major factors that influence the children development in their early years of life (Kidd and Fejerskov, 2013; Carvalho *et al.*, 2016; Variyam *et al.*, 1999; World Health, 2017; Reche *et al.*, 2020). Consumption of nutrient-poor diet is considered to be harmful for growing children as it makes them more vulnerable to nutrition-related diseases such as malnutrition, obesity, and dental caries (Galal *et al.*, 2005). After home care, it was found that nutritional awareness of the parents is the most influencing factor on their children's health (Sultana, 2017; Achalu *et al.*, 2019). Rates of dental caries in Saudi Children have been shown to be as high as 80% with meta-analyses showing this to be a problem across age groups (Al Agili, 2013; Khan *et al.*, 2013; Al-Rafee *et al.*, 2019). Several factors have been attributed to this, including poor dietary habits, lack of oral hygiene practice, and a lack of education and awareness among parents (Al Dosari *et al.*, 2004; Al Agili, 2013; Alhabdan *et al.*, 2018). Dental caries can be prevented through simple and cost-effective interventions such as avoiding cariogenic food and educating parents and caregivers about diet modalities (Mobley *et al.*, 2009; Huew *et al.*, 2012). Understanding the level of knowledge of the parents in diet and its effect on the oral health of their children is essential in order to point out the barriers and issues that causes the oral health disturbance (Variyam *et al.*, 1999; Sultana, 2017; World Health, 2017).

Despite the increase in studies on the prevalence of dental caries and oral hygiene practices among children in Saudi Arabia, there is little data on parental awareness of their children's diet in Saudi Arabia. Given this lacuna of data the main purpose of this study was to investigate the association between parents' awareness about the role of the quality of diet as a potential risk factor in causing dental caries in primary school children in Riyadh.

2. MATERIALS AND METHODS

This study was conducted in Riyadh city in Saudi Arabia and was completed in 2 months starting from February 14, 2020 until April 22, 2020. Ethical approval was obtained from the Institutional Review Board (IRB) of Riyadh Elm University (REU) with the registration number (FUGRP/2020/140/80) and IRB approval number FUGRP/2020/140/80/79).

Study design

A convenience sample of children attending pediatric clinics in Riyadh

Inclusion criteria

The inclusion criteria of this study involved healthy children aged between 5 – 12 years old of both genders, attending pediatric clinics in the region. Children with systemic diseases or any developmental anomalies were excluded.

Sample Studied

A total of 122 children were screened, the children who didn't present with both parents and those who had medical conditions were excluded from the study.

Outcome measures

After the parents signed the consent form, the remaining 103 children were examined to assess the severity of dental caries using the decayed, missing or filled teeth (dmft) index with a mouth mirror and dental explorer, along with a questionnaire that was given to the parents. The questionnaire was directly handed over to the parents of the selected children after giving a brief introduction about the research and its objectives. The questionnaire was a two pages document written in Arabic, the first page contained 9 personal and oral hygiene related questions for the parents, while the second page included 9 questions about the nutritional habits in the family to evaluate the awareness of the parents.

Statistical methods

The chi square test was used in the comparison of the nonparametric variables between the father and the mothers, while the t test was used to compare parametric variables. Binary logistic regression models with the absence or presence of dental caries as the dependent variable was developed to assess the associations between caries and demographic variables or diet and oral hygiene practices. Linear regression models with the dmft as dependent variable were developed to assess similar associations for the

severity of dental caries. All tests were carried out with alpha of 0.05. SPSS ver.25 (IBM SPSS, Armonk, NY USA) was used for all statistical analysis.

3. RESULTS

The sample comprised of 103 children (59 boys and 44 girls) and their parents. The children were aged between 5 and 12 years, with a mean age of 8.31 years (SD \pm 2.42 yrs). The mean age of the boys (8.26 \pm 2.42) was slightly higher than that of the girls (8.36 \pm 2.42) but the differences were not statistically significant ($t=156$, $p=0.876$). Both parents of each child were included in the survey. The fathers were aged between 29 years and 70 years of age (mean age 43.01 \pm 8.1 years) while the mothers were aged between 24 and 50 years of age (mean age 36.51 \pm 6.3 years). The Educational profile of the family is summarized in Table 1. Care was taken to make sure that our sample included families with different levels of family income (Fig 1). The habits and oral hygiene practices of the parents are summarized in table 2. The chi-square test showed that mothers smoked significantly less than fathers and had significantly better brushing and flossing practices.

Table 1 Educational of the parents

| | | Fathers | | Mothers | |
|-----------|---------------------------|---------|-------|---------|-------|
| | | Count | % | | |
| Education | Primary School (Literate) | 6 | 5.8% | 7 | 6.8% |
| | Intermediate School | 7 | 6.8% | 6 | 5.8% |
| | High School | 14 | 13.6% | 17 | 16.5% |
| | Diploma | 11 | 10.7% | 5 | 4.9% |
| | Graduate | 51 | 49.5% | 65 | 63.1% |
| | Postgraduate | 14 | 13.6% | 3 | 2.9% |

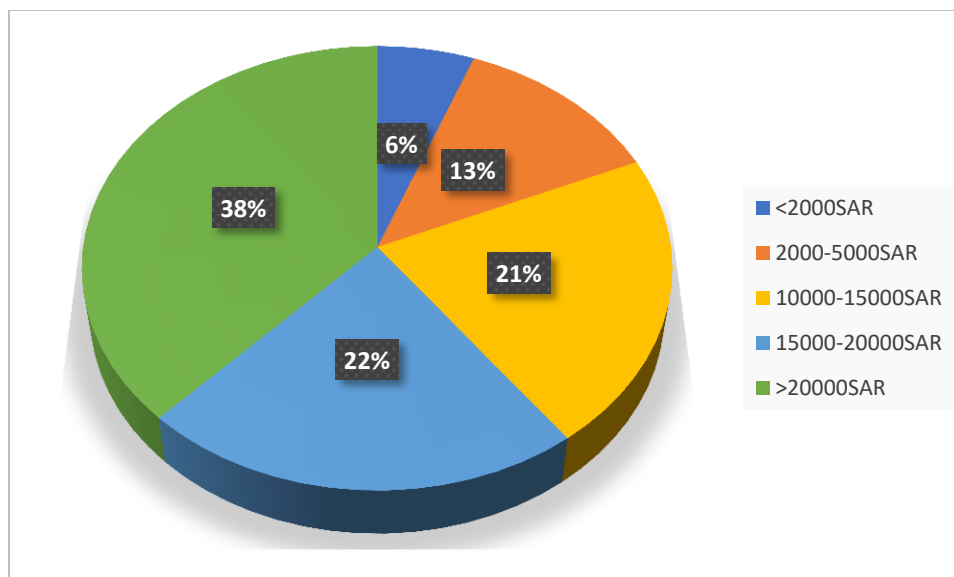


Figure 1 Income of the family

Table 2 Smoking and Oral Hygiene habits of the parents

| | | Father | | Mother | | Chi Square | Sig |
|-----------------|--------------|--------|-------|--------|-------|------------|---------|
| | | N | % | N | % | | |
| Smoking | No | 70 | 68.0% | 100 | 97.1% | 64.680 | <0.001* |
| | Yes | 29 | 28.2% | 2 | 1.9% | | |
| | Was a smoker | 4 | 3.9% | 1 | 1.0% | | |
| Brushing Habits | Never | 3 | 2.9% | 1 | 1.0% | 24.211 | 0.006* |
| | Irregular | 30 | 29.1% | 17 | 16.5% | | |
| | Regular | 70 | 68.0% | 85 | 82.5% | | |

| | | | | | | | |
|----------------|-----------|----|-------|----|-------|--------|--------|
| Flossing Habit | Never | 42 | 40.8% | 28 | 27.2% | 45.321 | <0.001 |
| | Irregular | 43 | 41.7% | 49 | 47.6% | | |
| | Regular | 18 | 17.5% | 26 | 25.2% | | |

*differences significant at $p < 0.05$

The children were further divided into those with at least one decayed, missing or filled carious lesion ($n=78$) and those who were caries free ($n=28$). There was no significant difference in the number of boys ($n=13$) and girls ($n=16$) who were caries free. The severity of dental caries was measured separately for the primary and permanent dentition. The severity of dental caries was measured separately for the primary and permanent dentition. In the primary dentition it was observed that there were no significant differences between the boys and the girls in the study (Table 3). Similar results were observed for the permanent teeth (Table 4).

Table 3 Caries severity in the Primary teeth

| | Gender | Mean | Std. Deviation | t | Sig |
|------|--------|--------|----------------|--------|-------|
| d | Male | 2.9322 | 3.25293 | -0.706 | 0.483 |
| | Female | 3.4318 | 3.92012 | | |
| m | Male | 1.0339 | 1.62911 | 0.106 | 0.916 |
| | Female | 1.0000 | 1.58481 | | |
| f | Male | .9492 | 1.82345 | -0.967 | 0.712 |
| | Female | 1.3182 | 2.03199 | | |
| dft | Male | 3.8814 | 3.30665 | -1.012 | 0.252 |
| | Female | 4.7500 | 4.35156 | | |
| dmft | Male | 4.9153 | 3.97096 | -971 | 0.347 |
| | Female | 5.7500 | 4.74525 | | |

d=decayed, m=missing, f=filled

Table 4 Dental caries in the permanent teeth

| | Gender | Mean | Std. Deviation | t | Sig |
|------|--------|--------|----------------|--------|-------|
| D | Male | .9322 | 1.41256 | -0.706 | 0.483 |
| | Female | 1.0909 | 1.50686 | | |
| M | Male | 0 | na | na | na |
| | Female | 0 | na | | |
| F | Male | .3559 | .80436 | -0.967 | 0.712 |
| | Female | .1395 | .35060 | | |
| DMFT | Male | 1.2881 | 1.67178 | -1.012 | 0.252 |
| | Female | 1.2558 | 1.63435 | | |

D=decayed, M=missing, F=filled

Regression models were developed to measure the effect of parental education and habits on the incidence of dental caries. Binomial logistic regression was developed with presence and absence of dental caries as the dependent variable. While linear regression models with dmft as dependent variable were developed for the assessment of impact of caries severity. When the socio-economic variables were related to the absence or presence of dental caries it was observed that there was a negative association between the presence of dental caries and the income of the family. The greater the income of the family the less the chance of child having dental caries (Table 5). The linear regression model however, showed that the sociodemographic variables had no impact on the severity of dental caries (Table 6). When the influence of parental habits and diet on the incidence of dental caries was observed it was seen that the oral hygiene practices of the family had no influence on the occurrence on dental caries (Table 7), however there was a strong negative correlation between the diet score and the incidence of dental caries. A similar observation was seen with the diets score and the severity of dental caries (Table 8).

Table 5 Impact of Socioeconomic Variables on the incidence of dental caries

| Variables in the Equation | | | | | | | |
|--|---------------------|--------|-------|-------|----|------|---------|
| | | B | S.E. | Wald | df | Sig. | Exp(B) |
| Step 1 ^a | Age of Father | .045 | .054 | .699 | 1 | .403 | 1.046 |
| | Age of Mother | -.005 | .061 | .007 | 1 | .935 | .995 |
| | Education of Father | .078 | .326 | .057 | 1 | .811 | 1.081 |
| | Education of Mother | -.421 | .347 | 1.477 | 1 | .224 | .656 |
| | Family Income | -1.034 | .405 | 6.511 | 1 | .011 | .356 |
| | Constant | 6.238 | 3.019 | 4.270 | 1 | .039 | 511.827 |
| a. Variable(s) entered on step 1: Age of Father, Age of Mother, Education of Father, Education of Mother, Family Income. | | | | | | | |

Table 6 Impact of Socioeconomic Variables on the severity of dental caries

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|----------------------------|---------------------|-----------------------------|------------|---------------------------|--------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 10.922 | 3.216 | | 3.396 | .001 |
| | Age of Father | .086 | .071 | .162 | 1.216 | .227 |
| | Age of Mother | -.098 | .080 | -.143 | -1.218 | .226 |
| | Education of Father | .730 | .412 | .232 | 1.770 | .080 |
| | Education of Mother | -.642 | .367 | -.196 | -1.749 | .083 |
| | Family Income | -1.370 | .357 | -.500 | -3.840 | .000 |
| a. Dependent Variable: dft | | | | | | |

Table 7 Influence of habits and diet on incidence of dental caries

| Variables in the Equation | | | | | | | |
|---|--------------------------|--------|-------|-------|----|------|--------|
| | | B | S.E. | Wald | df | Sig. | Exp(B) |
| Step 1 ^a | Total Diet Score | -3.024 | .132 | .032 | 1 | .007 | .077 |
| | Father's Brushing Habits | -.490 | .547 | .803 | 1 | .370 | .612 |
| | Mother's Brushing Habits | -.863 | .780 | 1.223 | 1 | .269 | .422 |
| | Father's Flossing Habit | -.435 | .354 | 1.507 | 1 | .220 | .647 |
| | Mother's Flossing Habit | .013 | .348 | .001 | 1 | .970 | 1.013 |
| | Constant | 5.186 | 2.245 | 3.478 | 1 | .002 | 65.767 |
| a. Variable(s) entered on step 1: Total Diet Score, Father's Brushing Habits, Mother's Brushing Habits, Father's Flossing Habit, Mother's Flossing Habit. | | | | | | | |

Table 8 Influence of habits and diet on severity of dental caries

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|----------------------------|--------------------------|-----------------------------|------------|---------------------------|--------|-------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 6.068 | 3.573 | | 4.698 | .003 |
| | Father's Brushing Habits | -.950 | .873 | -.118 | -1.088 | .279 |
| | Mother's Brushing Habits | -.047 | 1.114 | -.005 | -.043 | .966 |
| | Father's Flossing Habit | -.569 | .655 | -.096 | -.869 | .387 |
| | Mother's Flossing Habit | .258 | .636 | .044 | .406 | .685 |
| | Total Diet Score | -3.099 | .245 | .042 | 4.403 | .002* |
| a. Dependent Variable: dft | | | | | | |

4. DISCUSSION

Nutrition is essential for human life especially for children because it directly affects all aspects of their growth and development which will have an impact on their health as adults (Variyam *et al.*, 1999). Parents nutritional awareness is one of the most important and essential factors influencing the health of children. Hence, providing the parents with the right knowledge about nutrition and emphasizing on good oral health practices encourage their children to pick up more healthy decisions (Variyam *et al.*, 1999; Mobley *et al.*, 2009; Sultana, 2017). This study sought to establish the association between diet and multiple factors associated with the prevalence of dental caries including family income, parent's education level and oral health practices.

The role of socioeconomic factors in dental caries has received considerable attention in recent literature (Buldur, 2020; Östberg and Petzold, 2020; van Harten, 2020). There have been models developed in the West that have shown that while income is an important determinant of dental caries in children, parental education and oral health practices also play an equally important role (Östberg and Petzold, 2020). While this sample showed a significant association between income and dental caries, no similar associations were found between either parental education or parental oral hygiene practices. One reason for this could be the high rates of dental caries reported in the Riyadh region where the sample was selected (Al-Rafee *et al.*, 2019). The fact that income of the parents played more significant role than their education supports the argument that socio-economic deprivation is perhaps the most significant sociodemographic limiting factor in oral health (Östberg and Petzold, 2020; van Harten, 2020).

As a consequence of lack of oral awareness in parents, oral hygiene practices is an interesting observation in our study. There have been previous studies that have shown poor dietary habits and awareness of diet among parents in Saudi Arabia (Sultana, 2017). There have also been studies to show that caries prevalence is influenced by economic deprivations as well a poor oral hygiene habits (Al Dosari *et al.*, 2004; Alotaibi *et al.*, 2017; Alhabdan *et al.*, 2018). The results of the current study show that while these factors are linked, parental awareness of diet appears to play a more significant role than oral hygiene practices when controlled for socio-demographic variables. The association between diet, income and dental caries is interesting and supports literature from both Saudi Arabia and globally that unhealthy dietary habits due to frequent consumption of cariogenic food is higher among lower to middle groups because they are available and affordable in the markets (Sultana, 2017; World Health, 2017). Availability and accessibility to healthier food choices is considered to be the strongest influence on healthy eating behaviors at home, since control of sugar intake is an effective factor in preventing dental caries (World Health, 2017).

The patterns of dental caries, diet and income are in keeping with the findings of a recent region-wide survey of dental caries incidence and severity in Riyadh region (Al-Rafee *et al.*, 2019). This study has shown that the incidence of caries has increased among rural and semi-urban populations, in contrast to a previous survey of the region done in the 1990s. This finding is significant as it supports the argument that this also supports the argument that changing style of living and dietary patterns in developing countries have led to a marked increase in caries incidence in children (Huew *et al.*, 2012). The results of this study must be viewed taking into consideration certain limitations. The study used a convenience sample and though care was taken to represent families of all backgrounds the sample is not a randomized representation of the study. Despite this limitation, the study indicates that there is a definite significant association between the parental awareness of healthy dietary habits and dental caries. Further research, with randomized samples, is needed to follow up the results of this study.

5. CONCLUSION

Within the limitations of this study we can conclude that Parental awareness of the diet of their children and their implementation of a healthy diet has a significant negative association with caries incidence and severity among the surveyed parents in Riyadh region of Saudi Arabia.

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Author Contributions

All authors made substantial contributions to the conception or design of the work; or the acquisition, analysis or interpretation of data. Specifically, their contributions are as follows. Study conception and design: Almotawah F., Alobaida H., Abuhaimed N.; data collection: Alobaida H., Abuhaimed N., Alobaida R., Alotaibi S.; analysis and interpretation of results: Almotawah F., Alobaida R., Alotaibi S., Alttasan Y; draft manuscript preparation: Almotawah F., Alobaida H., Abuhaimed N., Alobaida R., Alotaibi S., Alttasan Y. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

Ethical approval

The study was approved by the Medical Ethics Committee of Riyadh Elm University (ethical approval code: the IRB approval number FUGRP/2020/140/80/79).

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Achalu P, Zahid N, Sherry DN, Chang A, Sokal-Gutierrez K. A Qualitative Study of Child Nutrition and Oral Health in El Salvador. *Int J Environ Res Public Health* 2019; 16(14):2508.
2. Al Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. *Saudi Dent J* 2013; 25(1): 3–11.
3. AlDosari AM, Wyne AH, Akpata ES, Khan NB. Caries prevalence and its relation to water fluoride levels among schoolchildren in Central Province of Saudi Arabia. *Int Dent J* 2005; 54(6):424–8.
4. Alhabdan YA, Albeshr AG, Yenugadhati N, Jradi H. Prevalence of dental caries and associated factors among primary school children: a population-based cross-sectional study in Riyadh, Saudi Arabia. *Environ Health Prev Med* 2018; 23(1):60.
5. Alotaibi F, Sher A, Khounghanian R. Prevalence of early childhood caries among preschool children in Dawadmi, Saudi Arabia. *Int J Med Sci Clin Invent* 2017; 4(6):3010–4.
6. Al-Rafee MA, AlShammery AR, AlRumikan AS, Pani SC. A Comparison of Dental Caries in Urban and Rural Children of the Riyadh Region of Saudi Arabia. *Front Public Health* 2019; 7:195.
7. Banerjee A, Doméjean S. The contemporary approach to tooth preservation: minimum intervention (MI) caries management in general practice. *Prim Dent J* 2013; 2(3):30–7.
8. Buldur B. Pathways between parental and individual determinants of dental caries and dental visit behaviours among children: Validation of a new conceptual model. *Community Dent Oral Epidemiol* 2020; 48(4):280–7.
9. Carvalho JC, Dige I, Machiulskiene V, Qvist V, Bakhshandeh A, Fatturi-Parolo C, Maltz M. Occlusal Caries: Biological Approach for Its Diagnosis and Management. *Caries Res* 2016; 50(6):527–42.
10. Galal OM, Ismail I, Gohar AS, Foster Z. School teachers' awareness about scholastic performance and nutritional status of Egyptian school children. *Food Nutr Bull* 2005; 26(2):275–80.
11. Harten M. Do socio-economic circumstances affect oral health related quality of life?. *Evid Based Dent* 2020; 21(1):10–11.
12. Huew R, Waterhouse P, Moynihan P, Kometa S, Maguire A. Dental caries and its association with diet and dental erosion in Libyan schoolchildren. *Int J Paediatr Dent* 2011; 22(1):68–76.
13. Khan SQ, Khan NB, Arrejaie AS. Dental caries. A meta analysis on a Saudi population. *Saudi Med J* 2013; 34(7):744–9.
14. Kidd E, Fejerskov O. Changing concepts in cariology: forty years on. *Dent Update* 2013; 40(4):277–86.
15. Mobley C, Marshall TA, Milgrom P, Coldwell SE. The contribution of dietary factors to dental caries and disparities in caries. *Acad Pediatr* 2009; 9(6):410–4.
16. Östberg AL, Petzold M. A longitudinal study of the impact of change in socioeconomic status on dental caries in the permanent dentition of Swedish children and adolescents. *Community Dent Oral Epidemiol* 2020; 38(4):271–9.
17. Reche AM, Nagpure SP, Sangwan PD, Jjodiya C, Nimbalkar GC, Deolia SG. Relationship between nutritional status, socio-economic and dental caries status of rehabilitated children of age 4-14 years in Central India. *Med Sci* 2020; 24(102):575–581.

18. Sultana N. Nutritional Awareness among the Parents of Primary School going Children. Saudi J Humanities Soc Sci 2017; 2(8):707–25.
19. Variyam JN, Blaylock J, Lin BH, Ralston K, Smallwood D. Mother's nutrition knowledge and children's dietary intakes. Am J Agric Econ 1999; 81(2):373–84.
20. World Health, O. Sugars and dental caries. Geneva: World Health Organization. 2017.